

REMARKS

Claims 1-20 are pending in the present application.

Claims 1-4, 10 and 11-13 have been rejected.

Claims 3-10 and 13-20 have been objected to.

Claim 1 has been amended for grammatical reasons.

Reconsideration of Claims 1-20 is respectfully requested.

In the September 9, 2004 Office Action, the Examiner objected to Claims 1-4, 10 and 13 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to point out and distinctly claim the subject matter which the Applicants regard as the invention. The Examiner objected to the use of the term “capable of” in Claims 1-4, 10 and 13. The Applicants respectfully disagree with the Examiner’s assertion that the term “capable of” renders Claims 1-4, 10 and 13 indefinite (not positive). The Applicants searched the on-line database of the U.S. Patent Office for issued U.S. patents that contain the term “capable of” in the claims. The search retrieved 198,526 patents. The Applicants respectfully assert that this is prima facie proof that the term “capable of” is acceptable claim language.

In Sections 1 and 2 of the September 9, 2004 Office Action, the Examiner rejected Claims 1-2 and 11-12 under 35 U.S.C. §103(a) as being unpatentable over United States Patent No. 6,671,499 to *Ylitalo et al.* (hereafter, simply “*Ylitalo*”) in view of United States Patent No. 6,725,057 to *Boyle* (hereafter, simply “*Boyle*”). By way of example, in rejecting Claim 1, the Examiner asserted that the *Ylitalo* reference shows essentially all of the limitations of Claim 1 except for the use of two mobile

station antennas and that the *Boyle* reference shows the use of two mobile station antennas, such that the combination of the *Ylitalo* reference and the *Boyle* reference renders Claim 1 obvious.

The Applicants respectfully disagree with the Examiner's rejection of Claims 1-2 and 11-12 and direct the Examiner's attention to amended Claim 1, which recites the unique and non-obvious limitations emphasized below:

1. For use in wireless network communications system comprising a base transceiver station having an adaptive antenna array and a mobile station having a first mobile antenna and a second mobile antenna, an apparatus for improving downlink performance of said adaptive antenna array of said base transceiver station, said apparatus comprising:

a spatial signature estimator associated with said base transceiver station, said spatial signature estimator capable of obtaining a spatial signature from a signal received by said base transceiver station from said first mobile antenna and further capable of obtaining a spatial signature from a signal received by said base transceiver station from said second mobile antenna; and

correlation circuitry coupled to said spatial signature estimator, said correlation circuitry capable of using spatial signatures obtained from said first mobile antenna and from said second mobile antenna to identify a least changing spatial signature and further capable of using said least changing spatial signature to obtain a downlink beamforming weight vector. (emphasis added)

Applicants respectfully assert that the above-emphasized limitation are not disclosed, suggested, or even hinted at in the *Ylitalo* reference or the *Boyle* reference, or in the combination of the *Ylitalo* and *Boyle* references.

The Applicants respectfully assert that the Examiner's assertion that purported correlation circuitry 202 and 203 in the *Ylitalo* reference is "capable of uses [a] least changing spatial signature to obtain a downlink beamforming weight vector" is incorrect. In support of this assertion, the Examiner relied on column 5, lines 1-37 and column 6, lines 1-10 of the *Ylitalo* reference.

The text of the *Ylitalo* reference at column 5, lines 1-37 states:

Furthermore, the transceiver comprises estimating means 201, measuring means 202 and means for directing the antenna beam 203. In practice, the estimating means 201, the measuring means 202 and the means for directing the antenna beam 203 are located in the base station 200. The estimating means 201 estimate the directions of arrival of the signals received by the transceiver, when the signals that have propagated via different paths arrive at the transceiver from different directions of arrival. The measuring means 202 measure the strengths of signals received from different DoAs. The means for directing the antenna beam 203 command the antenna arrays to form downlink antenna beams. When preparing commands, the directing means utilize the DoAs of the received signals. In addition, the directing means 203 command the antenna arrays to direct antenna beams in the downlink, whereby the quality of downlink transmission can be improved. In practice, this means that the antenna beams are directed downlink in such a way that the subscriber terminal 100 does not remain in the shadow area.

FIG. 3 illustrates signals arriving at the transceiver from different angles of reception. Let us assume that the base station 200 receives signals 211, 212, 213 transmitted by the subscriber terminal 100 that is located in the sector of the cell, which signals propagate via different paths to the base station 200. Let us further assume that the signal 211 is the strongest of the received signals, the signal 212 is the next strongest and the signal 213 is the weakest in intensity. The received signals are applied to the estimating means 101, which estimate the DoA of the signal to be received by means of its partly known components, such as a training sequence or a pilot signal.

Below there is a formula (1), by means of which the directions of arrival of the received signals are determined by using the correlation properties of partly known signals. The directions of arrival can also be estimated by other known methods. (emphasis added).

The text of the *Ylitalo* reference at column 6, lines 1-16 states:

As appears clearly from the formula (2), the directing means 203 command that the main antenna beam be formed in the direction, wherefrom the measuring means 202 have measured the strongest signal. In the case of FIG. 3, the above means that if the angular spread of the signals 211, 212, 213 received by the base station 200 is small, the main antenna beam is directed towards the signal 211. In general, the signal that propagates as directly as possible has a relatively high signal power on reception as compared with the signal that propagates via a longer path to the receiver.

If the angular spread of the received signals is wide, i.e. if the directions of arrival of the received signals differ greatly from one another, it is possible for the beam directing means 203 to command the antenna or the antenna array to form, in addition to the main antenna beam, one or more diversity beams in the downlink direction. A formula (3) utilized when deciding on diversity beam forming is presented in the following. (emphasis added)

As the above-cited text clearly shows, the base station in the *Ylitalo* reference forms a beam based on the strongest signal, not the least changing signal. In fact, the above-cited text does not even mention a “least changing” signal (or the equivalent). Furthermore, the *Boyle* reference does nothing to overcome this shortcoming of the *Ylitalo* reference.

In sum, Claim 1 recites unique and non-obvious limitations that are not disclosed, suggested or even hinted at in either the *Ylitalo* reference or the *Boyle* reference. This being the case, Claim 1 contains subject matter that is patentable over the *Ylitalo* reference and the *Boyle* reference, either individually or in combination. Furthermore, dependent Claims 2-9 depend from Claim 1 and recite all of the unique and non-obvious limitations recited in Claim 1. Thus, Claims 2-9 are also patentable over the cited prior art references.

The Applicants respectfully assert that independent Claim 11 recites limitations that are analogous to the unique and non-obvious limitations recited in Claim 1. This being the case, Claim 11 is patentable over the *Ylitalo* reference and the *Boyle* reference, either individually or in combination. Finally, dependent Claims 12-20, which depend from Claim 11, recite all of the unique and non-obvious limitations recited in Claim 11. Thus, Claims 12-20 are also patentable over the cited prior art references.

The Applicants note that the Examiner has stated that Claims 1-3 and 13-20 would be allowable if rewritten in independent form. The Applicants agree with the Examiner's statement, but note that this point is moot in view of the Applicants' arguments above.

SUMMARY

For the reasons given above, the Applicant respectfully requests reconsideration and allowance of pending claims and that this Application be passed to issue. If any outstanding issues remain, or if the Examiner has any further suggestions for expediting allowance of this Application, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at *jmockler@davismunck.com*.

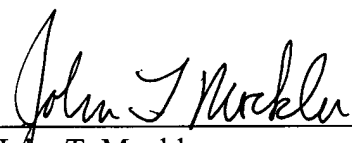
The Commissioner is hereby authorized to charge any additional fees connected with this communication or credit any overpayment to Deposit Account No. 50-0208.

Respectfully submitted,

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